



# Linking Scholarship and Practice: Narrative and Identity in Science

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In recent years, science communicators have enthusiastically embraced storytelling as a means of dramatizing the process of science and humanizing the scientists who conduct it. Compared to evidence-based argumentation, narratives do tend to be more engaging, more comprehensible, more believable, and more persuasive to non-specialist audiences. However, the gaps between research and practice in this field are considerable, in part because both comprise many distinct areas of expertise. Here, we draw on our experience as a professional storytelling organization and seek to narrow some of these gaps by linking the scholarship to our practice, and to encourage engagement with scholars about future directions in the field. This perspective article intends to synthesize theory and practice to address two major questions: What is the impact of stories on audiences? What is the impact of stories on their tellers? We consider both questions in the knowledge that science and science communication are only beginning to address the historic and ongoing underrepresentation of stories from many racial, ethnic, cultural, religious, gender, and socioeconomic groups. We focus on how stories influence social stereotypes about scientists, as well as identity and belonging within science, and conclude with the link between narrative identity and mental health and well-being.

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## INTRODUCTION

Modern science relies on a tradition of formal training and public scholarship that pairs meticulous study with vigorous debate. This rational and self-correcting enterprise has led to audacious and profound achievements—rockets and computers, antibiotics and organ transplants—ideas and innovations that have expanded and enhanced the human experience in marvelous ways. Or so the story goes.

Inside and outside of academia, many people idealize science as an objective, dispassionate, and above all, logical process (e.g., Howe, 2009). Yet any description of science represents a powerful set of rhetorical choices. Who is held up as heroic or groundbreaking? How are historical events described? What events and which people are minimized or altogether ignored, and why?

Decades of work by social scientists, philosophers, and historians of science offer “compelling evidence that science is in fact a richly rhetorical enterprise that reflects the complex, ambiguous, and probabilistic world that scientists and the rest of us actually inhabit” (Charney, 1993). In other words, scientific discourse has explicitly persuasive goals, and we should not mistake a rhetorical strategy of impersonal, dispassionate language as sufficient evidence of an author’s objectivity.

The social reality of all human beings is shaped by powerful and intersecting cultural dimensions, such as race, class, gender, ability, religion, nationality, and more. Claims of “rational” or “objective” truth often serve to reinforce existing power structures, or more pointedly, to “smuggle the privileged choice of the privileged to depersonify their claims and then pass them off as the universal authority and the universal good” (Bell, 1995).

Science is never undertaken in a vacuum. The questions scientists ask, which scientists ask those questions, the methods they employ, and their ultimate conclusions take place within a broader cultural, political, and social context. Interrogating the principles and assumptions of science leads us to profound questions about the nature of reality (ontology) and how we acquire knowledge (epistemology). To ignore the ontological and epistemological dimensions of science is to compromise the validity of research designs and muddle the interpretation of results (Moon and Blackman, 2014). To divorce the products of research from the environment in which they are generated is to only tell half the story.

This perspective article is focused on telling a fuller story of science through first-person narratives. We present our own efforts as practitioners, describe the challenges we experience, and discuss the academic research that inspires and supports our work. We hope this contributes to a more “coherent science communication research enterprise” (National Academies of Sciences Engineering Medicine, 2017) by supporting a richer exchange of ideas between theory and practice.

## FIRST-PERSON SCIENCE STORYTELLING

The Story Collider is a non-profit organization that produces live shows and a weekly podcast dedicated to true, personal stories about science. Since 2010, we have produced more than 300 of these storytelling shows, and each features five people telling a 10-min story. All stories are recorded, and a subset are published in the weekly Story Collider podcast.

Story Collider storytellers range from pre-eminent senior scientists to comedians who last studied science in high school. They are patients, parents, writers, researchers, and more—a large and diverse group whose only unifying factor is that they want to talk about how science has touched their life. Self-identified demographic data for storytellers has been collected since 2018. Of 569 respondents to date, 42% are people of color, and 67% are women or non-binary. The concept is not to “give them a voice,” but rather, to pass the microphone and offer a stage, particularly to perspectives that Western academic science has historically ignored, diminished, erased, and actively silenced (Smith, 2017; Dung et al., 2019). Each storyteller works with two Story Collider producers for 4–6 weeks before the show to refine their story. Stories vary enormously in topic, tone, how narrowly they focus on science, and how widely they range into the full spectrum of human experience. Some are hilarious, others are heartbreaking. Our producers encourage storytellers to examine and, when appropriate, challenge claims about the nature of science, the norms of scientific institutions, the behaviors of scientists,

and perhaps most importantly, their own past and possible future selves.

## DEFINITIONS AND UTILITY OF STORIES

Storytelling can be unscientific, or worse, anti-scientific. The word itself evokes childhood and fairytales. Its connotations of whimsy, fantasy, and play can feel like the antithesis of “serious science.” Yet story comprehension and recall are cognitive developmental milestones (Dosman et al., 2012), and folklore is a field for serious academic inquiry (da Silva and Tehrani, 2016). “Narrative” sounds more serious, particularly when rendered as a “phenomenological hermeneutical method for researching lived experience” (e.g., Lindseth and Norberg, 2004). We use the two terms interchangeably, as reflects popular usage (Fludernik, 2009), and our definition focuses on “series of thematically and temporally linked events” (Green, 2008), or put simply, characters experiencing events and coping with the consequences.

Stories have cognitive, emotional, and, perhaps most importantly, behavioral outcomes. Storytelling is argued to have evolved as an adaptation that promotes cooperation, spreads cooperative norms, and punishes norm-breakers (Coe et al., 2006). In one study of a modern hunter-gatherer society, the Agta people of the Philippines, people showed a strong preference to live with good storytellers over good foragers, which is remarkable in a food-sharing society (Smith et al., 2017). The same study also found that good storytellers have significantly greater reproductive success. These findings help explain, on a biological level, why this behavior evolved in humans. It is the psychological functions of storytelling that dominate our ongoing practices.

Narratives are also sensemaking devices. They are means by which groups of people collectively reduce their uncertainty, resolve ambiguity, attribute consequences, and assign blame, among other things. The term “sensemaking” comes from organization science and has been described as a largely invisible social process focused on “the ongoing retrospective development” of plausible rationalizations of what people are doing (Weick et al., 2005). This is a slightly convoluted definition, but it is useful because it focuses on (1) the fact that sensemaking is a perpetual undertaking, (2) that action nearly always precedes cognition, and (3) that talk is a uniquely powerful kind of action. As Weick et al. (2005) note, “Situations, organizations, and environments are talked into existence.” Modern science is no exception.

## THE EVIDENCE BASE FOR NARRATIVE APPROACHES

In the past 30 years or so, narrative has gained an increasingly high profile in science communication discourse (Norris et al., 2005; Avraamidou and Osborne, 2009; Dahlstrom, 2014), as well as within social research more broadly. Qualitative methods, such as narrative analysis, are particularly well-suited to disciplines that must take complex social and political realities into account

to achieve their aims. Consider public health, for example. While quantitative methods can determine *how many* people comply with medical advice, qualitative methods can ask *how* and *why* compliance does or does not happen (Sutton and Austin, 2015). It is clear that effective, efficient interventions require both kinds of knowledge.

Yet to those focused on the natural sciences, narrative approaches still feel frustratingly understudied and perhaps oversold. The “establishment often points to what they consider to be a lack of rigorous evidence that narrative could be a superior conduit [for science messages]” (Murphy et al., 2013). There is, however, a growing body of empirical research directly comparing narrative vs. non-narrative communication—particularly within public health (e.g., Shen et al., 2015) and consumer engagement (e.g., van Laer et al., 2014).

Compared to evidence-based argumentation, narratives often are more engaging, more understandable, and more persuasive to audiences (Dahlstrom and Ho, 2012). Such outcomes align particularly well with the goals of science communicators (Besley et al., 2016, 2018), such as getting people interested or excited about science, ensuring that people are informed, and demonstrating the expertise of the research community. Stories are understood to achieve these ends by (1) reducing resistance or facilitating processing of new and/or difficult information, (2) encouraging cognitive and emotional states that strengthen attitudes, and (3) providing social models for behavior change (Murphy et al., 2013). All of these cognitive and emotional shifts happen during what audiences generally experience as an entertaining experience, if they think about it at all. When people sit down to read a text, or listen to a podcast, they do not ask, “Is this a narrative?” Instead, they focus on what’s happening in the story world. What do the events mean for the protagonist? Why did a character make a particular choice, and how does the outcome compare to her intent? (Ryan, 2007).

This focus on characters is essential, particularly when those characters represent a diversity of personalities, perspectives, and experiences. As individuals, we may or may not personally identify with any given character, but collectively, characters represent social norms, which in turn influence identity and feelings of belonging (Greenwald et al., 2002). In educational settings, representation is positively linked with student achievement outcomes (Grissom et al., 2015). “Scientist Spotlight” coursework that incorporates Story Collider episodes has been shown to reduce stereotypical views of scientists and correlates with higher course grades, and increased interest in science generally, as well as in STEM majors specifically (Schinske et al., 2016).

Characters play an essential role in creating empathy and in making stories resonate with listeners’ lived experiences (Dessart and Pitardi, 2019). It is that resemblance, the verisimilitude of the story, that matters. It matters so much that even fictional stories can have real-life consequences. One study found that reading fiction “significantly increased empathy toward others, especially people the readers initially perceived as “outsiders” (e.g., foreigners, people of a different race, skin color, or religion)” (Johnson et al., 2014). More broadly, reading literary fiction has been linked to improvements in both empathy and

theory of mind, in both long-term associations and short-term experiments (Oatley, 2016).

## TRANSPORTATION, NARRATIVE PERSUASION, AND INTERPRETATION

In both fiction and non-fiction, the feeling of being swept into a story is called narrative transportation. Unlike cognitive elaboration, which depends on propositional reasoning and critical thinking, transportation is “an integrative melding of attention, imagery, and emotion” (Green and Brock, 2000). Such transportation depends on numerous factors, including the skillfulness of the storyteller, the environment in which a story is consumed, and individual factors, such as prior knowledge or need for affect (Mazzocco et al., 2010). The Story Collider explicitly strives for narrative transportation in our live events and podcast episodes, because people who are highly transported exhibit greater attitude and belief change in response to stories than those who aren’t (Green, 2004). The Story Collider is particularly interested in the power of personal stories to shift stereotypes about the identity and values of scientists. Our stories challenge old assumptions about who can do science, who can speak for science, and to whom science belongs.

The power of stories to shape beliefs can itself be a cause for concern. We know that stories can amplify ignorance and lead to the outright rejection of scientific data, as with anti-vaccine propaganda. While evidence-based argumentation “uses abstractions to infer about particular examples, narrative uses particular examples to infer abstractions” (Dahlstrom and Ho, 2012). Accordingly, The Story Collider considers the intent of the storyteller, the accuracy of the story content, and whether the story is broadly generalizable.

We have also borrowed and applied the concept of an “interpretive community.” We know a narrative will never have a single, objectively true meaning that is understood by all audiences at all times, but “a community of readers who share a set of interpretive strategies, and who look at a text from the same frame of reference and with an agreed upon procedure for determining its meaning, can unite in a shared understanding of it” (Ceccarelli, 2010). As humanity faces climate change, pandemics, food insecurity, and so many other existential threats, instead of asking, “Why don’t people trust science?” “How do we get them to believe facts instead of stories?” or even, “How can we tell better stories about science?” The Story Collider asks, “What happens when we reconceptualize audiences as essential members of our interpretive communities?” For example, our work with patient-led research organizations, such as the Rare As One network, positions patients and parents as equals and collaborators to clinicians and researchers. Our choices of storytellers flatten traditional hierarchies and challenge expectations of who has earned the right to speak and who needs to listen. This strategy aligns with dialogue-based science communication, principles of knowledge co-creation, and restorative justice approaches.

## NARRATIVE IDENTITY AND MENTAL HEALTH

Although most discussions of storytelling in science communication focus solely on audience effects, some of the most interesting impacts of narrative are not on listeners, but on the tellers themselves.

“Stories can be a way for humans to feel that we have control over the world. They allow people to see patterns where there is chaos, meaning where there is randomness. Humans are inclined to see narratives where there are none because it can afford meaning to our lives—a form of existential problem-solving” (Delistraty, 2014). And perhaps the most existential of all questions are “Who am I? And who are you?” This is the question of identity.

Culture, language, and experience interact with introspection and conversation with others to weave a social being around a private self (Archer, 2000). This “reflexive self” is under constant revision. Students studying outside their home country, for example, experience moving from having a unified and stable identity to one that is “becoming fragmented, composed not of a single, but of several, sometimes contradictory or unresolved, identities” (Bond, 2019). A similar dynamic is created for anyone sacrificing parts of their identity to fit their own or other people’s images of a successful scientist. Whether pressures are internal or external, implicit or explicit, fitting into science as a profession can lead individuals to minimize their culture, hide religious beliefs, remain in the closet, and/or change the way they dress, speak, or otherwise present themselves to the world. The result is chronic, low-level stress (Ryan et al., 2005), which may arise due to role conflicts, the strain of inauthenticity, and the cumulative burden of code-switching (modifying language or behaviors to suit different cultural norms, Cross et al., 2017). The toll is even greater for people possessing multiple intersecting marginalized identities (Crenshaw, 1989).

Self-identity and self-narratives are intimately involved in mental health. One study found that 40% of the science graduate students in their survey reported experiencing moderate to severe depression and/or anxiety (Evans et al., 2018). Similar data for faculty, senior researchers, and science industry professionals is unavailable, but careers marked by continual progress through “liminal and troublesome spaces” (Bond, 2019) pose ongoing challenges. In addition, people from marginalized groups disproportionately experience hostile work environments, institutional discrimination, financial concerns, and the weight of familial and societal expectations (Dyer et al., 2019; Santos-Díaz, 2019).

Mental health stigma, particularly negative beliefs about one’s own symptoms and professional assistance, is a key barrier to seeking help. Authentic, personal stories can variously function as a means of reducing stigma, as a process for coping and/or healing, and as paradigms for recovery (Llewellyn-Beardsley et al., 2019; Nickerson et al., 2019). We borrowed from music therapy to speculate that live performance of such stories in front of an audience can raise awareness of social issues,

transform perceptions, and may increase support and validation storytellers receive from their communities (Vaudreuil et al., 2019). Our evaluation program provides early support for these ideas. When asked “What is your most meaningful takeaway or experience from this workshop?” after participating in grant-funded 2-day intensive workshops, 30% of respondents cited the “value of the supportive community in the workshop.” 25% mentioned realizing that everyone has a story to tell, and 18% mentioned introspection & self-reflection ( $n = 59$ , Sickler and Lentzner, 2020).

## CONCLUSIONS

Some kinds of knowledge can only be generated from objective empirical observation. An electron has a mass of  $9.109 \times 10^{-31}$  kg, regardless of who observes it. There is, however, a slippery slope from specific observations to unexamined assumptions about science and scientists.

Science is often mythologized as a pure meritocracy dedicated to logic and the elimination of bias. Such claims ignore history, the output of disciplines from psychology to sociology, and the lived experiences of countless people. Science is penicillin and pasteurization, but it is also Mengele and Tuskegee. And despite increasing attention to issues of diversity, equity, and inclusion, science still largely reflects and promotes the interests of a privileged minority of people (Adams et al., 2015; McCoy and Rodricks, 2015; Gill, 2018). This will require substantial and ongoing investment to undo, and a key part of this work involves confronting the disconnect between idealized science and all the tacit understandings, customs, and taken-for-granted aspects of science as it currently exists. First-person narratives of science are uniquely suited to describing and disrupting this so-called “hidden curriculum” (Hafferty, 1998; Michalec and Hafferty, 2013).

The Story Collider produces hundreds of stories about science each year. Our tellers frequently challenge preconceived notions about how science works and who scientists are. Ten years of our experience, as well as a wide-ranging set of research findings and academic theories, support the idea that these stories are uniquely suited to help our audiences engage with the kind of dissonant, disorienting, or troublesome information that is the necessary first step in transformational learning (Timmermans, 2010).

Stories can be used to comfort or confront, to clarify or complicate. They help audiences gain new perspectives and explore new knowledge. They help tellers gain greater insight into their own experiences and motivations, and to find purpose in their lives. Finally, storytelling is a key part of any collective change. If individuals and institutions wish to bring a more representative, equitable, and just version of science into existence, they must attend to which stories are told, which stories are suppressed, and whose stories are centered.

## DATA AVAILABILITY STATEMENT

The datasets generated for this study are available on request to the corresponding author.

## ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

Concept and data collection: LN and EB. Research: LN, SB, RM, KW, and MZ. Draft content: LN, SB, RM, KW, and MZ. Writing: LN. Editing: LN, MZ, SB, RM, and KW. All authors contributed to manuscript revision, read and approved the submitted version.

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**Conflict of Interest:** The authors declare full-time employees (LN, EB) or part-time contractors (SB, RM, KW, MZ) at The Story Collider.

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